Clark County Department of Air Quality
Ozone Advance Program
Progress Report
Update

August 2019

(Page Intentionally Left Blank)

Table of Contents

List of Tables

List of Figures

List of Acronyms and Abbreviations

Acronyms

AQS	Air Quality System
CMAQ	Congestion Mitigation and Air Quality
DAQ	Clark County Department of Air Quality
EPA	U.S. Environmental Protection Agency
GOE	Governor's Office of Energy
NAAQS	National Ambient Air Quality Standard
NDOT	Nevada Department of Transportation
NEI	National Emissions Inventory
NRS	Nevada Revised Statute
PPA	power purchase agreement
PV	photovoltaic
RPS	Renewable Portfolio Standard
RTC	Regional Transportation Commission of Southern Nevada
SEZ	Solar Energy Zone
WESTAR	Western States Air Resources Council
WRAP	Western Regional Air Partnership

Abbreviations

CO	carbon monoxide
CO_2	carbon dioxide
kW	kilowatt
kWh	kilowatt-hour
MW	megawatt
MWh	megawatt-hour
NO_x	nitrogen oxides
ppb	parts per billion
ppm	parts per million
VOC	volatile organic compound

1. Introduction

The Clark County Department of Air Quality (DAQ) enrolled in the U.S. Environmental Protection Agency (EPA) Ozone Advance program on June 12, 2013. The program's goals are to ensure that maintenance and attainment areas offer continued health protection, to better position those areas to remain in attainment, and to efficiently direct available resources toward actions to address ozone and its precursors. As Clark County enters its seventh year of participation in the program, DAQ continues to investigate innovative ways to reduce precursors to ozone formation and new ways to reach out to and educate the public.

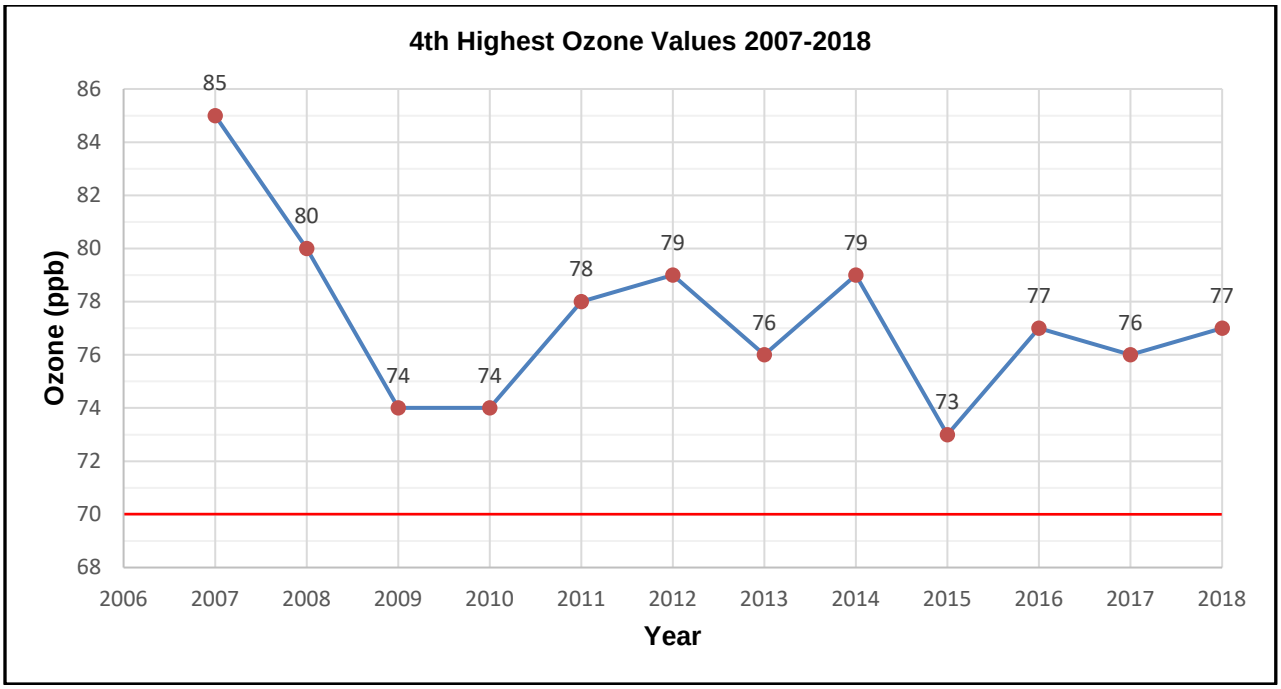
For the 2019 update, DAQ will be conducting a study to better understand the relationship between nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in southern Nevada. DAQ is also considering a number of efforts that may help lower ozone levels in the next several years. These include, but are not limited to, ways to convert additional local agency fleets to electric power; ways to convert diesel and gasoline equipment to electric equipment or replace it with newer, more efficient models; additional public outreach, which will include promoting public awareness through social media; and the importance of reducing vehicle idling. In addition, DAQ is reaching out to other agencies and entities to enhance our coordination and partnerships and explore additional ozone-reducing activities.

A. Current Attainment Status

On June 4, 2018, EPA designated portions of Clark County (Hydrographic Area 212) as being in nonattainment of the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS) of 70 parts per billion (ppb), effective August 3, 2018. By law, the state of Nevada uses hydrographic areas to define regions that are in attainment, unclassifiable, and in nonattainment.

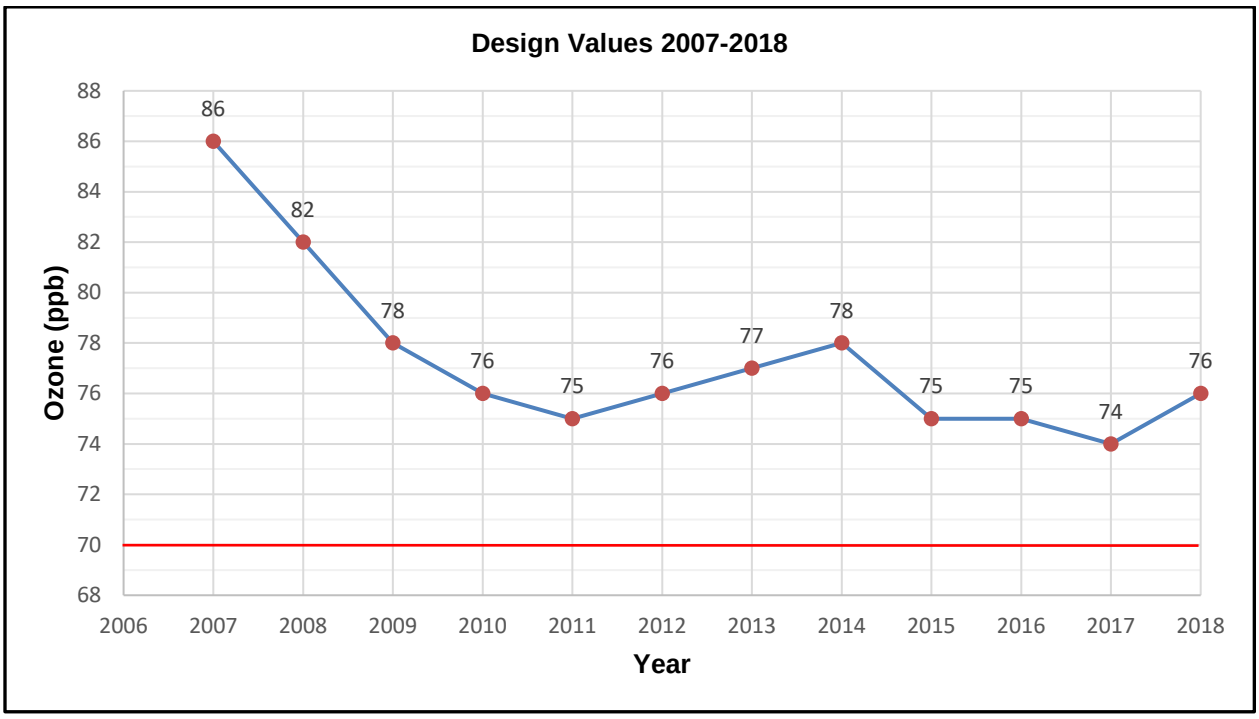
Figure 1-1 shows Clark County's fourth-highest annual ozone values for 2007–2018, which make up the design value calculations. The fourth-highest value for the respective year is averaged with the two previous years for a three-year average to derive the design value for the most current year.

Clark County's ozone design value history (Figure 1-2) shows a downward trend from 2007 through 2011, then an increase in design values in 2012, 2013, and 2014. However, the design value went down again in 2015, to 75 ppb, and stayed there in 2016. The design value decreased in 2017 to 74 ppb, then increased to 76 ppb in 2018, which is 6 ppb above the NAAQS.



Data Source: EPA's Air Quality System (AQS) AMP480 Design Value Report, ID 1761669, July 11, 2019.
Note: 2015 NAAQS (70 ppb) depicted as a red line.

Figure 1-1. Fourth-Highest Annual Ozone Value by Year (2007–2018).



Data Source: EPA's AQS AMP480 Design Value Report, ID 1761669, July 11, 2019.
Note: 2015 NAAQS (70 ppb) depicted as a red line.

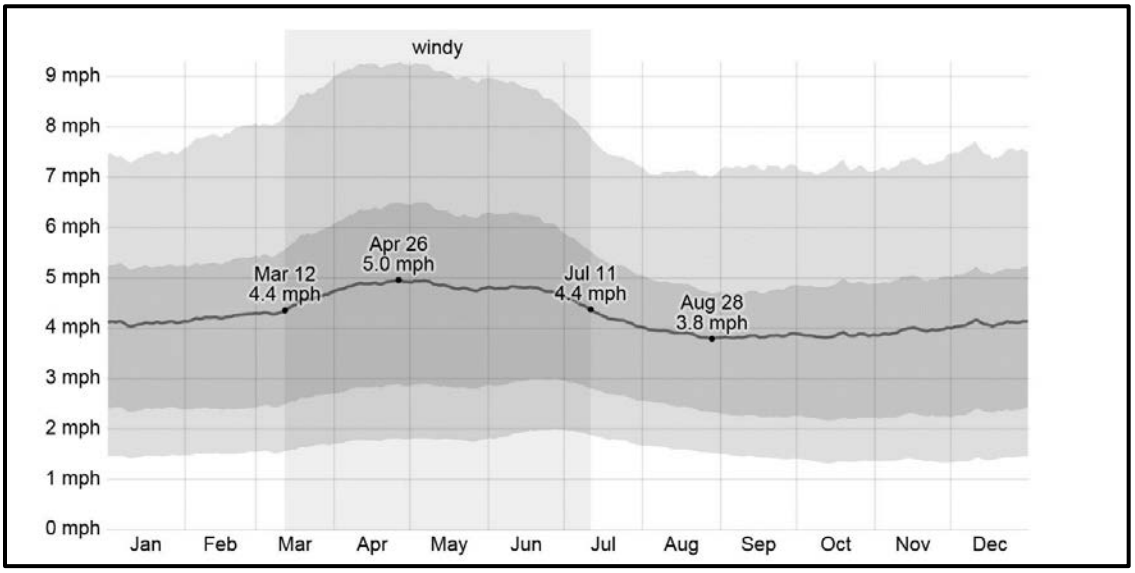
Figure 1-2. Ozone Design Value History (2007–2018).

B. Impacts of Meteorological Conditions on Ozone Concentrations

High-ozone events in Clark County generally occur during weather patterns characterized by high pressure. Regional wind fields are influenced by the local terrain, which channels winds through passes, slopes, and valleys. Such slope-and-valley wind systems are local, thermally-driven flow circulations created in complex terrain like the Las Vegas Valley. These systems directly affect the transport and dispersion of pollutants.

Wind Speeds

According to historical data collected in the Las Vegas Valley from 1980–2016, the highest monthly average wind speeds occur between mid-March and mid-July (Figure 1-3), the same period when ozone concentrations are highest in Las Vegas. A dark gray line depicts the average of mean hourly wind speeds. The 25th to 75th percentile band is marked in a dark gray shade, while the 10th to 90th percentile band is indicated by a light gray shade.

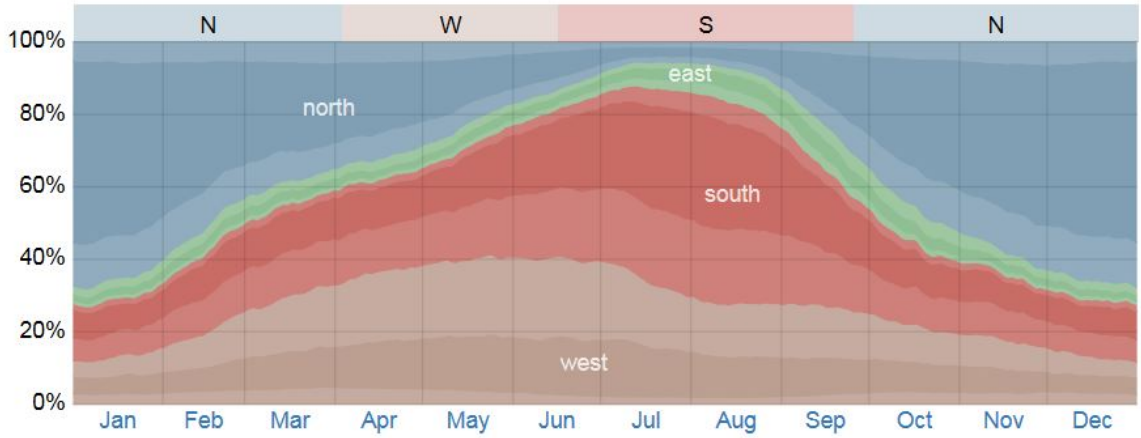


Data Source: http://weatherspark.com/averages/30697/Las-Vegas-Nevada-United-States.

Figure 1-3. Average Wind Speed (1980–2016).

Average Wind Direction

Figure 1-4 shows the average wind direction in the Las Vegas Valley over an entire year. The figure excludes hours in which the mean wind speed is less than 1 mile per hour. The dark colors represent the four cardinal directions (north, east, south, and west); the lightly tinted areas represent the intermediate directions (northeast, southeast, southwest, and northwest). The most common wind direction in the valley is from the southwest.



Data Source: https://weatherspark.com/y/2228/Average-Weather-in-Las-Vegas-Nevada-United-States.

Figure 1-4. Average Wind Direction (1980–2016).

The northwest quadrant of the Las Vegas Valley typically experiences the highest ozone readings when concentrations in Clark County are elevated. Stagnant conditions over California's population centers often increase ozone concentrations, and the predominant wind flow can transport this ozone to southern Nevada, contributing to exceedances throughout Clark County. Figure 1-5 shows Clark County's predominant airflow, which generally enters from the south (following I-15) and exits to the northwest (following U.S. Highway 95).

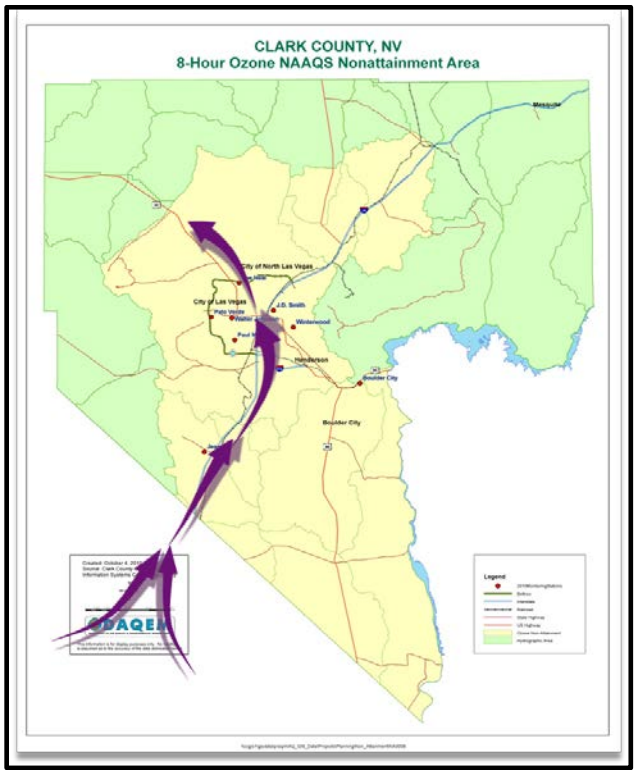


Figure 1-5. Airflow in Clark County.

DAQ studies have confirmed ozone transport from Southern California into Clark County; however, the contribution of local versus transported ozone is difficult to quantify without extensive regional modeling analyses.

C. Ozone Health Effects and Sources

Ozone, a gas comprised of three oxygen atoms, occurs both in Earth's upper atmosphere (stratosphere) and at ground level (troposphere). Ozone in the stratosphere, which extends upward from 6 to 30 miles, occurs naturally and protects life from harmful ultraviolet rays. In the troposphere, ozone is a pollutant that poses a significant health risk, especially for children, the elderly, and people with chronic illnesses. Ozone may also damage crops, trees, and other vegetation.

Ground-level ozone is not usually emitted directly into the air, but is formed through chemical reactions between NO_x and VOCs in the presence of sunlight. Vehicle exhaust, emissions from commercial and industrial sources, gasoline vapors, chemical solvents, and natural sources emit NO_x and VOCs. Since sunlight is an important formative factor, ozone pollution is usually a summertime problem.

Natural (biogenic) sources, mostly trees, produce much of the VOCs (also called hydrocarbons) that contribute to ozone formation in Clark County. In cities, man-made (anthropogenic) VOCs also contribute to ozone production. Sources of anthropogenic VOCs include unburned gasoline fumes from gas stations and cars, industrial emissions, and consumer products such as paints, solvents, and fragrances in personal care products.

The reaction of atmospheric nitrogen at the high temperatures produced when fuels are burned creates NO_x. Power plants, highway vehicles (the major contributor in urban areas), and off-road equipment (e.g., construction equipment, lawn care equipment, boats) are major sources of NO_x. Other contributions come from small, widely distributed sources ("area sources"), such as fires and natural gas-fired water heaters.

Ozone can irritate lung airways and cause an inflammation that resembles sunburn. Symptoms include wheezing, coughing, pain when taking a deep breath, and difficulty breathing during exercise or outdoor activities. Children and those with respiratory problems are particularly susceptible, but even healthy people who are active outdoors can be affected. Repeated exposure to ozone pollution over many months may cause permanent lung damage. Even when concentrations are low, ozone pollution may aggravate asthma, reduce lung capacity, and increase susceptibility to respiratory illnesses like pneumonia and bronchitis.

Ground-level ozone may also affect plants and ecosystems because it interferes with the ability of plants to produce and store food, making them more susceptible to disease, insects, harsh weather, and other air pollutants. Stressed vegetation can impact crop and forest yields.

Ozone source categories include:

Biogenic: Trees and other natural sources.

Mobile: Vehicles traveling on paved roads, e.g., cars, trucks, buses, and motorcycles.

Non-road: Vehicles not traveling on paved roads, e.g., construction and agricultural vehicles, lawn care equipment, motorboats, and locomotives.

Point: Smokestack sources, such as industry and utilities.

Area: VOC sources, including gas stations, dry cleaners, print shops, and consumer products, and NO_x sources, including forest fires, residential fires, and natural gas-fired water heaters.

2. Emission Sources

DAQ submits emission inventory data to EPA for stationary, area, on-road, and non-road sources. Most of this emission information is based on local data, figures submitted by source facilities, or estimates made using population data. EPA includes these emission inventories in the triennial National Emissions Inventory (NEI), which contains data not only for criteria pollutants but also for hazardous air pollutants (some of which are VOCs). EPA is currently developing the 2017 NEI, which will be available for public review in early 2020. DAQ will update the emissions data in this section with the 2017 NEI data in the next Ozone Advance Progress Report.

The following sections focus on NO_x and VOCs, considered the primary precursors for ozone. Tables 2-1 and 2-2 provide NO_x and VOC data for four source categories: stationary, on-road, non-road, and biogenics. Figures 2-1 and 2-2 illustrate the data in these tables. The stationary source group includes point and area sources.

Table 2-1. NO_x Emissions for 2014 (tons)

Source Category	2014 Emissions
Stationary	11,292
On-road	24,780
Non-road	12,040
Biogenic	600
TOTAL	**48,712**

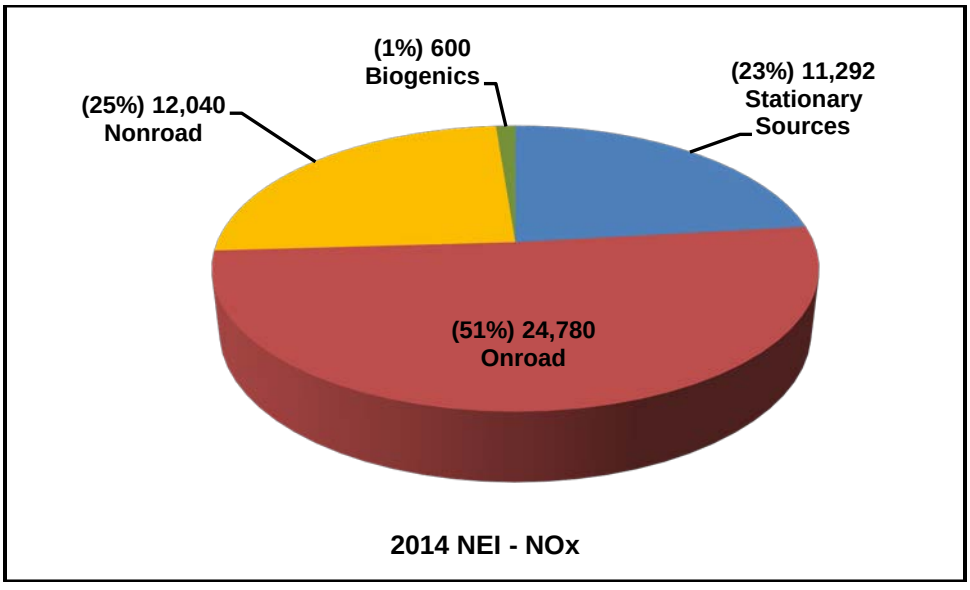


Figure 2-1. NO_x Source Apportionment.

Table 2-2. VOC Emissions for 2014 (tons)

Source Category	2014 Emissions
Stationary Sources	23,856
Onroad	11,402
Nonroad	7,299
Biogenic	142,592
TOTAL	**185,149**

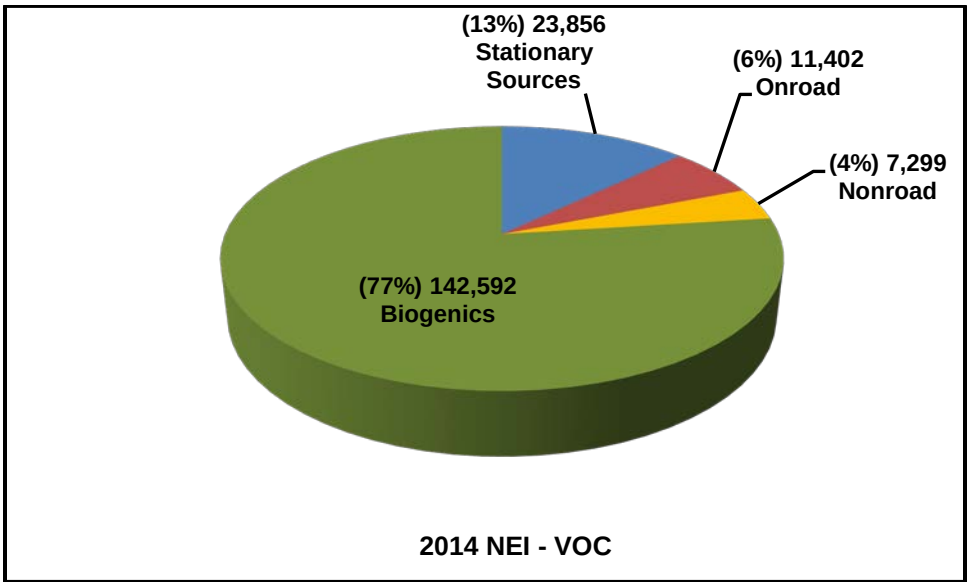


Figure 2-2. VOC Source Apportionment.

A. Emissions and Source Categories

Tables 2-3 and 2-4 list 2014 Tier 1 NO_x and VOC emission data by tons per year (tpy), respectively. Vehicles (on-road and non-road) make up the two highest categories of NO_x emissions and account for 76% of the 2014 total in Clark County. Biogenics make up the highest category of VOC emissions, accounting for 77% of the 2014 total. Solvent use is the second-highest category of VOCs, followed by on-road vehicles.

Table 2-3. NO_x Emissions in 2014 (tons)

TIER 1 NAME	NO_x	% of Total
Highway vehicles	24,780	51
Off-highway	12,040	25
Fuel comb. – elec. util.	4,924	10
Fuel comb. – other	2,615	5
Other industrial processes	1,791	4
Fuel comb. – industrial	1,049	2

TIER 1 NAME	NO_x	% of Total
Biogenics – vegetation & soil	600	1
Waste disposal & recycling	868	2
Miscellaneous	16	<1
Petroleum & related industries	21	<1
Storage & transport	5	<1
Solvent utilization	2	<1
Metals processing	<1	<1
TOTAL	**48,711**	

Table 2-4. VOC Emissions in 2014 (tons)

TIER 1 NAME	VOC	% of Total
Biogenics – vegetation & soil	142,592	77
Highway vehicles	11,402	6
Solvent utilization	17,127	9
Off-highway	7,299	4
Storage & transport	3,263	2
Fuel comb. – other	846	<1
Other industrial processes	196	<1
Miscellaneous	136	<1
Waste disposal & recycling	1,969	1
Fuel comb. – elec. util.	285	<1
Fuel comb. – industrial	14	<1
Petroleum & related industries	18	<1
Metals processing	2	<1
TOTAL	**185,149**	

Approximately 75% of the 2014 NO_x emissions from the electric utilities sector were emitted from Reid Gardner Generating Station, a coal-fired power plant (Table 2-5).

Nevada Senate Bill 123, passed in June 2013, accelerated the retirement of the Reid Gardner Generating Station, significantly reducing NO_x emissions in Clark County. Three of the plant's four units closed in 2014, and the remaining unit closed in March 2017.

Table 2-5. NOx Emissions from Reid Gardner

	Tons per Year
NEI 2014 Electric Utilities	4,924
Reid Gardner utility boilers 2014	3,673
Reid Gardner utility boiler 2015	524
Reid Gardner utility boiler 2016	406
Reid Gardner utility boiler 2017	389

In 2015, Reid Gardner NO_x emissions were 524 tons per year, a reduction of 86 percent from 2014 levels. NO_x emissions from Reid Gardner decreased to 406 tons in 2016 and 389 tons in 2017 (Table 2-5).

3. Stakeholders

DAQ continues to engage with stakeholder groups and provide a forum to review and comment on state implementation plans, Exceptional Event Rule demonstration packages, county rule-makings, and other documents and actions. Stakeholder groups include members of the regulated community, environmental groups, other Clark County communities, state agencies, and EPA.

The **Southern Nevada Fleet Association** is a nonprofit group whose goal is to improve vehicle efficiency and reduce operating costs by advancing clean technologies, networking between agencies, and providing opportunities for education and training.

The **Metropolitan Planning Subcommittee** assists the Executive Advisory Committee in preparing recommendations to the Regional Transportation Commission of Southern Nevada (RTC). The subcommittee considers transportation planning and programming issues that require investigation and analysis.

The **Southern Nevada Regional Planning Coalition** was created in 1999 by Senate Bill 436, and was further refined in January 2000 by interlocal agreements between Clark County, the City of Las Vegas, the City of Henderson, the City of North Las Vegas, the City of Boulder City, and the Clark County School District Board of Trustees under the authority of Nevada Revised Statute (NRS) 277.180. The coalition prepares a biennial report on air quality policies and implementation plans adopted by DAQ, including ozone implementation plans and policies. The Coalition completed the "Southern Nevada Strong" regional plan, which includes policies that provide for alternative modes of transportation.

The Nevada **Advisory Committee on Control of Emissions from Motor Vehicles** was established in June of 1990 by the Nevada state legislature. The committee was charged to:

- Establish program goals and objectives for control of motor vehicle emissions.
- Identify areas where funding should be made available.
- Review and make recommendations concerning adopted regulations.

Committee members are appointed by the deputy director of the Nevada Department of Motor Vehicles and meet at least quarterly. See Nevada Administrative Code 445B.853–857 for details.

The Western States Air Resources Council (WESTAR) was founded in 1988 by eight state air agencies, and has since grown to fifteen states plus several local and tribal air quality agencies. The council's purposes are to:

- Promote the exchange of information related to the control of air pollution for use in state and federal activities, as authorized by air quality statutes and regulations.
- Develop processes and procedures for consideration by Western states, federal land managers, and EPA to meet air quality objectives and protect environmental resources.
- Discuss air quality issues of common concern.

- Report on the status of efforts undertaken to achieve air quality objectives.
- Establish work groups, task forces, etc., to investigate specific topics and recommend a course of action for council members.
- Adopt resolutions and policy statements for council member implementation or use during the development of local, state, and federal programs, regulations, and laws.

WESTAR changed its bylaws in 2013, allowing DAQ to join as an ex-officio member, and the department is a very active participant now that ozone transport has become a regional issue. During meetings and conferences, WESTAR discusses possible control measures and other ways to reduce NO_x and VOC emissions. The council has been an excellent platform to exchange information with agencies outside of Clark County and to evaluate their control programs.

The Western Regional Air Partnership (WRAP), formed in 1997, is a membership organization supporting Western regional air quality analyses and the planning needs of its members. WRAP is a voluntary partnership of states, tribes, federal land managers, local air agencies, and EPA whose purpose is to understand current and evolving regional air quality issues in the West. WESTAR and WRAP have joined together in a partnership.

The issues WRAP addresses include, but are not limited to:

- Implementation of, and future planning for, the Regional Haze Rule.
- Air quality issues related to ozone, particulate matter, nitrogen deposition and critical loads, mercury, and other pollutants.
- Emission sources from all sectors, both domestic and international.
- The effects of air pollution transport.
- The effects of climate change on regional air quality.

To address these issues, WRAP develops, maintains, and shares databases; supports technical analyses; and provides access to data and information from various sources to produce consistent, comparable, and complete results for use by individual members and agencies.

The Southern Nevada Home Builders Association has received several prestigious awards for its work on local environmental issues, including protection of multispecies habitat, air quality, dust control, and water and energy conservation. DAQ is a member of its community planning and infrastructure committee, which meets regularly to discuss issues of land use, environment, air and water quality, and other categories important to home builders in Clark County.

The **DAQ Air Quality Planning Division and Monitoring Division Committee** is comprised of DAQ personnel who meet monthly to discuss air quality data-related concerns, key projects related to meeting and maintaining the NAAQS, and other issues related to EPA regulatory requirements. The committee examines issues with local and transported ozone, particulate matter, and other criteria pollutants, and recently supervised a study of summer ozone patterns in Clark County. It reviews DAQ's Monitoring Network Plans, monitor site locations, Exceptional Event Rule demonstration packages, data analyses, special sampling needs (e.g., for fireworks and wildfires), and other reports and projects that require oversight.

The Nevada Air Quality Agencies Consortium includes representatives from EPA Region 9, the Nevada Division of Environmental Protection, DAQ, and Washoe County's Air Quality Management Division. These agencies meet biennially to discuss environmental issues in Nevada and the requirements of upcoming regulatory documents and reports.

Nevada air agencies, including the Nevada Division of Environmental Protection (NDEP), DAQ, and Washoe County's Air Quality Management Division, have a monthly teleconference to discuss air quality issues pertaining to the state of Nevada. Issues the teleconference covers include, but are not limited to, ozone transport, the Ozone Advance Program, implementation plans, and exceptional events. Table 3-1 lists stakeholder organizations and their meeting frequency.

Table 3-1. Stakeholder Organizations and Frequency of Meetings

Name of Organization	Frequency of Meetings/Teleconferences
Southern Nevada Fleet Association	Every other month
Metropolitan Planning Subcommittee	Every other month
Southern Nevada Regional Planning Coalition	Monthly
Southern Nevada Home Builders Association	Monthly
Advisory Committee on Control of Emissions from Motor Vehicles	Quarterly
Western States Air Resources Council	Semiannually
Western Regional Air Partnership	Semiannually
DAQ Air Quality Planning Division and Monitoring Division Committee	Monthly
Nevada Air Quality Agencies Consortium	Biennial
Nevada Air Agencies	Monthly

4. Energy Programs

In 2017, Nevada ranked second in the nation in utility-scale electricity generation from geothermal energy and fourth from solar energy (http://www.eia.gov/state/print.cfm?sid=nv). Those two sources together accounted for 19% of Nevada's net electricity generation in 2017. This was due in part to Nevada's Renewable Portfolio Standard (RPS) (NRS 704.7801), which requires electric utilities in the state to generate, acquire, or save a certain percentage of electricity annually through renewable energy systems or energy efficiency measures. The law was amended in 2019 (Senate Bill 358) to require a 50% contribution from renewable energy by 2030.

The RPS, along with federal grants, has been the driver for many renewable energy projects in Nevada. This section summarizes the status of major renewable energy projects currently operating, under construction, or in development.

A. Solar

Figure 4-1 shows renewable energy capacity installed and the energy generated, respectively, in 2017. "Nameplate capacity" is the maximum rated electric output a generator can produce under specific conditions. "Generation" is the amount of electricity a generator actually produces over a specific time. In the year 2017, 3,074 megawatts (MW) of renewable energy were installed and 7,963,545 megawatt-hours (MWh) were generated (http://energy.nv.gov/uploadedFiles/energynv-gov/content/Home/Features/2018%20SOE.pdf).

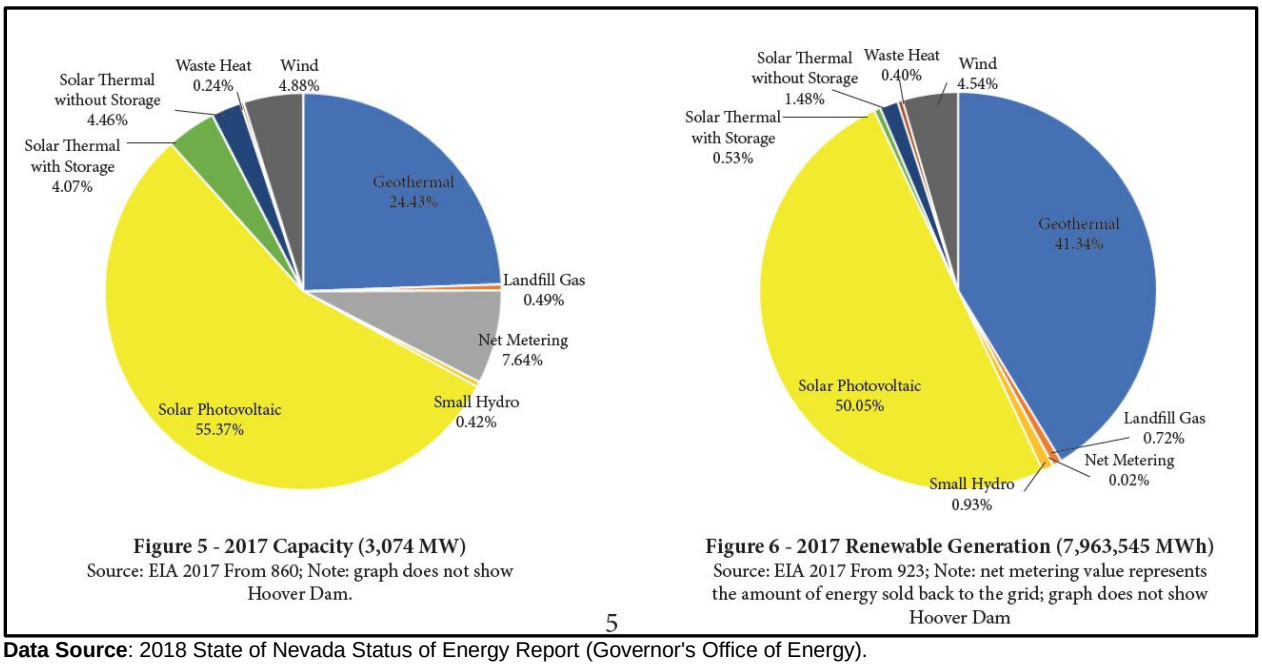


Figure 5 - 2017 Capacity (3,074 MW)
Source: EIA 2017 From 860; Note: graph does not show Hoover Dam.

Figure 6 - 2017 Renewable Generation (7,963,545 MWh)
Source: EIA 2017 From 923; Note: net metering value represents the amount of energy sold back to the grid; graph does not show Hoover Dam

Data Source: 2018 State of Nevada Status of Energy Report (Governor's Office of Energy).

Figure 4-1. Nevada Renewable Capacity and Generation.

A total of 3,451 MW put Nevada fourth nationally in the category of total installed solar capacity. There is enough solar generation in the state to power 609,000 homes (http://www.seia.org/state-solar-policy/nevada).

Table 4-1 lists solar generating projects now operating in Clark County; Table 4-2 lists solar projects that are in development.

Table 4-1. Clark County Solar Projects in Operation

Owner	Plant Name	Nameplate Capacity	Power Purchase Agreement	Completed
Acciona Solar Power	Nevada Solar One	75 MW	NV Energy	June 2007
TerraForm Power	Nellis I Solar Star	14 MW	Nellis AFB	December 2007
Sempra Energy	Copper Mountain 1	58 MW	PG&E	December 2010
Southern Power Company	Apex Nevada Solar	20 MW	NV Energy	2012
Enbridge	Silver State North Solar Energy Center	52 MW	NV Energy	May 2012
Sempra Energy	Copper Mountain 2	154 MW	PG&E	July 2012
Southern Power Company	Spectrum Nevada Solar	30 MW	NV Energy	2013
NextEra Energy	Mountain View Solar	20 MW	NV Energy	January 2014
Sempra Energy	Copper Mountain 3	255 MW	Southern California Public Power Authority	May 2014
American Capital/ Searchlight Solar LLC	Searchlight Solar I	17.5 MW	NV Energy	January 2015
TerraForm Power	River Mountain Solar	14 MW	Southern Nevada Water Authority	January 2016
SunPower	Nellis AFB Solar Array II	15 MW	Nellis AFB	February 2016
NextEra Energy	Silver State South Solar Energy Center	250 MW	SoCal Edison	December 2016
Sempra Energy	Copper Mountain 4	94 MW	SoCal Edison	December 2016
SunPower	Boulder Solar I	100 MW	NV Energy	December 2016
SunPower	Boulder Solar II	50 MW	NV Energy	February 2017
First Solar	Moapa Southern Paiute Solar Project	250 MW	LA Dept. Water & Power	March 2017
EDF Renewables	Switch Solar 1	79 MW	NV Energy	December 2017
EDF Renewables	Switch Solar 2	100 MW	NV Energy	December 2017
174 Power Global	Techren Solar I	100 MW	NV Energy	December 2018

Table 4-2. Clark County Solar Projects in Development

Owner	Plant Name	Nameplate Capacity	Power Purchase Agreement	Status
Swinerton Renewable	Techren Solar 2	200 MW	NV Energy	Under construction
Invenergy-MGM	Harry Allen Solar Energy Project	100 MW	MGM Resorts	Completion scheduled for 2020
Sempra Renewables	Copper Mountain Solar 5	250 MW	NV Energy	Completion scheduled for 2021
8minute Solar Energy	Eagle Shadow Mountain Solar Farm	300 MW	NV Energy	Construction to start in 2020
8minute Solar Energy	Southern Bighorn Solar Center	300 MW	NV Energy	Construction to start in 2022
Nextera Energy	Yellow Pine Solar	250 MW	Unknown	EIS Process
Arevia Power	Gemini Solar	690 MW	NV Energy	EIS Process
Techren Solar LLC	Techren Solar 3,4, and 5	100 MW	NV Energy	Proposed

B. Nevada Governor's Office of Energy

The Nevada Governor's Office of Energy (GOE) oversees state energy programs under NRS 701 and 701A, advises the governor on energy policy, and administers grant/rebate programs using state and federal funds. GOE administers the Green Building Tax Abatement Program as an incentive for business owners to improve the energy efficiency of new and existing buildings. To qualify for the partial tax abatement, applicants must earn a minimum number of points for energy conservation: this is determined either by an Energy Star score at the Silver Level or higher in the Leadership in Energy and Environmental Design (LEED) rating system, or by two globes or higher in the Green Globes rating system. In 2018, 28 buildings in Nevada, representing more than 21 million square feet of space, received a Green Globes or LEED certification. There are currently 145 buildings participating in the program (http://energy.nv.gov/uploadedFiles/energynvgov/content/Home/2018%20SOE%20web(1).pdf).

C. City of Las Vegas

The City of Las Vegas receives 100 percent of its power from renewable energy sources after entering into a Renewable Energy Agreement with NV Energy. The city now runs more than 140 facilities—everything from City Hall to parks to streetlights—on clean energy (https://cityoflasvegas.tumblr.com/post/154385263383/mayor-announces-city-power-comes-from-100).

The city also powers on-site facilities with solar panels in the City Hall plaza, solar shade canopies at city parks, and solar arrays on city-owned building roofs and at the wastewater treatment plant.

5. Mobile Sources

A. Volkswagen Settlement

In 2017, Volkswagen (VW) settled with the U.S. government and California after it was discovered that the company violated the Clean Air Act by making cars designed to cheat on smog tests. Thousands of VW cars in Nevada emitted NO_x over the legal limit; Nevada received $24.8 million through the VW settlement to help fund projects to offset the excess pollution emitted.

NDEP has developed a Beneficiary Mitigation Plan with input from the Nevada Advisory Committee on the Control of Emissions from Motor Vehicles. Approximately $17 million of the VW settlement is allocated for projects under the Diesel Emission Mitigation Fund (DEMF). Figure 5-1 shows a list of projects in Clark County awarded under DEMF's first annual competitive funding cycle.

Awardee	Award Amount	Project
Clark County		
Allegiant Air	$157,200.00	Replacement from diesel to electric of two pieces of airport ground support equipment.
Clark County Department of Aviation	$90,000.00	Diesel repower of five airport shuttle bus engines.
Clark County School District	$150,000.00	Diesel replacement of five school buses.
Republic Services	$200,000.00	Replacement from diesel to natural gas of five refuse trucks.
Southern Nevada RTC	$300,000.00	Replacement from diesel to natural gas of five transit buses.
Southwest Airlines	$3,655,661.29	Replacement from diesel and gasoline to electric of 109 pieces of airport ground support equipment.
United Airlines	$658,043.40	Replacement from diesel to electric of twenty-one pieces of airport ground support equipment.

Data Source: https://ndep.nv.gov/air/vw-settlement/demf-awards

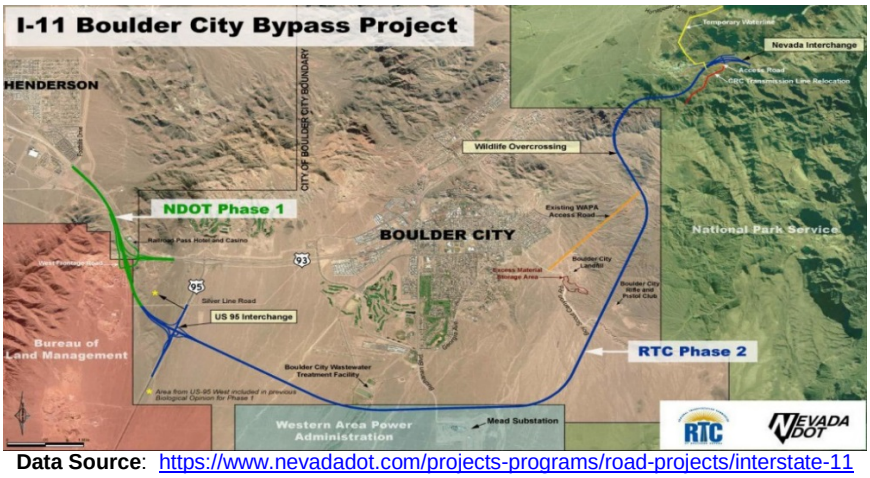
Figure 5-1. DEMF Funded Projects in Clark County.

B. Project NEON

Project Neon will widen 3.7 miles of Interstate 15 between Sahara Avenue and the U.S. 95/I-15 interchange near downtown Las Vegas. This stretch of I-15 is the busiest in Nevada, carrying more than 300,000 vehicles daily—a number projected to double by 2035 (http://ndotproject-neon.com/learn/overview/). Project NEON is expected to reduce accidents and other travel delays, bringing down idling times and NO_x emissions. The project includes High-Occupancy Vehicle lanes between U.S. 95 and I-15 (20 miles), along with better connections to surface streets into and out of the downtown area. Construction began in July 2016 and is scheduled for completion in 2019.

C. Boulder City Bypass / Interstate 11

The Boulder City bypass involves road improvements to U.S. Highway 93, a major commercial corridor and the only route through Boulder City. Construction began in May 2015; the Nevada Department of Transportation constructed the 2.5-mile Phase 1 portion of I-11 from Railroad Pass to U.S. 95 (Figure 5-2), while the RTC managed the 12.5-mile Phase 2 route from U.S. 95 to U.S. 93, near the Hoover Dam bypass bridge. Construction was completed in August 2018 (http://i-11nv.com/).



Data Source: https://www.nevadadot.com/projects-programs/road-projects/interstate-11

Figure 5-2. I-11 Boulder City Bypass Project.

U.S. 93 carries more than 34,000 vehicles per day on the main street of Boulder City. The Boulder City bypass allows traffic to flow through the area without the stoplights and congestion associated with the current route.

D. Clark County Fleet

The county has 2,271 vehicles, 420 of which are hybrids. The fleet contains 13 Chevy Volts and 130 SmartWay vehicles—cars and trucks that EPA has certified for improved fuel efficiency and reduced environmental impact.

E. Club Ride

In April 2015, EPA honored RTC's Club Ride program with a Clean Air Excellence Award, which "recognizes and honors outstanding innovative efforts to help make progress in achieving cleaner air." Club Ride is a free program designed to improve air quality by encouraging commute alternatives, e.g., carpooling, vanpooling, walking, bicycling, public transport, compressed work weeks, and telecommuting. It has partnered with nearly 335 employers to register more than 41,000 commuters in Clark County. The program removed nearly 6.4 million vehicle travel miles from the road, resulting in the reduction of 63 tons of carbon monoxide (CO), 18 tons of NO_x, and 14 tons of VOCs in 2018.

F. Congestion Mitigation and Air Quality Improvement Program

DAQ has secured program funding to purchase hybrid electric vehicles. Phase I (fiscal year 2017 [FY17] to FY20) of the funding comprises 10 Chevy Volts (plug-in hybrid electric vehicles) and 35 Chevy Malibu hybrids (hybrid electric vehicles). In Phase II of the project, 16 electric vehicles and 60 hybrids will be purchased from FY21 to FY24. Tables 5-1 and 5-2 show total vehicle emission reductions and total emissions reduction compared with a midsize gasoline car for Phase I. Similar data for Phase II are shown in Tables 5-3 and 5-4.

Table 5-1. Phase I Emission Reductions

Vehicle Type	Chevy Volt		Chevy Malibu Hybrid	
Pollutant	Emission Reductions (kg/day/vehicle)	Total Emission Reductions over Vehicle Life (kg/all vehicles)	Emission Reductions (kg/day/vehicle)	Total Emission Reductions over Vehicle Life (kg/all vehicles)
VOCs	0.005	228	0.003	436
CO	0.071	2,962	0.040	5,807
NO_x	0.005	192	0.003	401

Table 5-2. Phase I Emission Reduction Comparison

Pollutant	Chevy Volt Reduction	Chevy Malibu Hybrid Reduction
VOCs	80%	43%
NO_x	73%	43%
Average:	**77%**	**43%**

Table 5-3. Phase II Emission Reductions

Vehicle Type	Electric		Hybrid	
Pollutant	Emission Reductions (kg/day/vehicle)	Total Emission Reductions over Vehicle Life (kg/all vehicles)	Emission Reductions (kg/day/vehicle)	Total Emission Reductions over Vehicle Life (kg/all vehicles)
VOCs	0.010	602	0.002	563
CO	0.073	4,362	0.032	7,117
NO_x	0.004	265	0.002	462

Table 5-4. Phase II Emission Reduction Comparison

Pollutant	Electric Reduction	Hybrid Reduction
VOCs	100%	43%
NO_x	94%	43%
Average:	**97%**	**43%**

G. Anti-Idling Regulations

Section 45 of the Clark County Air Quality Regulations, "Idling of Diesel Powered Motor Vehicles," prohibits idling of diesel-powered trucks or bus vehicles for more than 15 consecutive minutes. The only exemptions are for emergency vehicles; vehicles used to repair or maintain other vehicles; vehicles stopped because of traffic congestion on a highway or street; vehicles whose engines must idle to perform a specific task, such as trenching or hoisting; and any vehicle idling while maintenance procedures are being performed at a repair facility.

H. Voluntary Airport Low Emissions Program

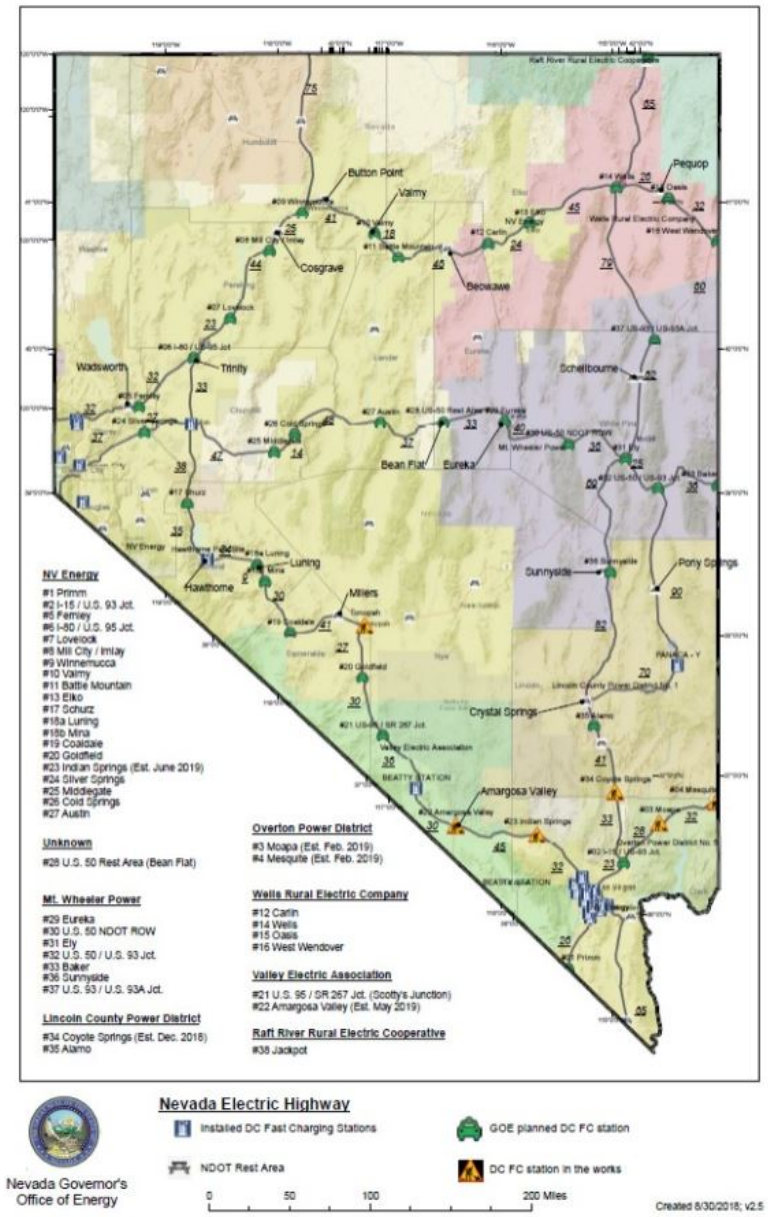
The VALE program was established in 2004 to encourage airports to implement clean technology projects that improve air quality. VALE is available to commercial airports located in nonattainment or maintenance areas; projects generate Airport Emission Reduction Credits that are recognized by EPA to meet future air emission regulation requirements (https://www.faa.gov/airports/environmental/vale/media/VALE-brochure-2017.pdf). According to the Federal Aviation Administration (FAA), McCarran International Airport, North Las Vegas Airport, and Henderson Executive Airport are eligible for the VALE program. In June 2019, the Clark County Department of Aviation (DOA) submitted a VALE grant application to the FAA for McCarran International Airport. The grant ($2.95 million) will fund the installation of electric charging infrastructure (140 electric charging ports or 70 2-port electric chargers) at a total project cost of $3.30 million. The chargers will be used for airport ground support equipment being electrified using VW settlement funds.

I. Nevada Electric Highway

The Nevada Electric Highway began as a joint venture between the GOE, NV Energy, and the Valley Electric Association to expand Nevada's infrastructure for charging electric vehicles. Using federal and state grants, the three partner with businesses along U.S. 95 to provide charging stations on the road between Reno and Las Vegas in the first phase of the project. Charging stations are operational in Tonopah, Beatty, Hawthorne, and Fallon (Figure 5-3), and a station is under construction in Indian Springs. Each location has two Level 2 chargers and one Direct Current Fast Charger. Business owners will provide free charging services for the first five years.

Phase II of the Nevada Electric Highway officially began in 2017 with the completion of a charging station in Panaca. At the completion of Phase II, charging stations will be deployed on the state's remaining major interstate and highway corridors, including I-15, I-80, U.S. Highway 93,

and U.S. Highway 50 (http://energy.nv.gov/Programs/Nevada_Electric_Highway/). NDEP expects that 15% of the VW settlement fund will go to support the development of the Nevada Electric Highway (https://ndep.nv.gov/air/vw-settlement/bmp).



Data Source: https://www.nvenergy.com/cleanenergy/electric-vehicles/evhighway

Figure 5-3. Nevada Electric Highway.

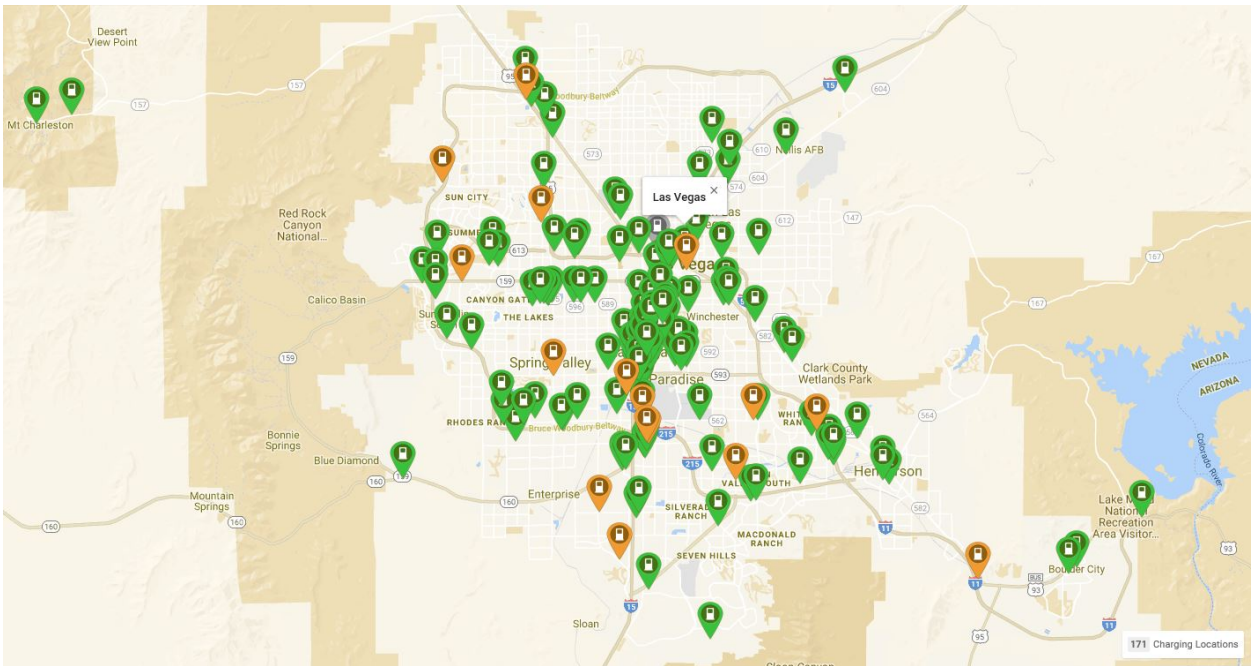
J. RTC Bike Share Program

RTC Bike Share was launched in 2016 to enhance the transportation options in downtown Las Vegas. The program, with 21 stations and 180 bikes, complements the dedicated green bike lanes. In the past two years, 113,464 miles were travelled in 34,909 bike rides. RTC estimates Bike Share

has taken approximately 52 tons of CO_2 out of the air (https://bikeshare.rtcsnv.com/wp-content/uploads/2018/11/2-year-snapshot.pdf). After conducting a test in March 2019 with five electric pedal-assist bikes, RTC is evaluating the addition of electric bikes to the program.

K. Electric Vehicle Charging Stations

Clark County has more than 170 electric vehicle charging locations (https://www.plugshare.com/), the majority of which are free to the public (Figure 5-4).



Data Source: https://www.plugshare.com/

Figure 5-4. Electrical Vehicle Charging Stations in the Las Vegas Area.

L. Southern Nevada Strong

The Southern Nevada Strong Regional Plan was created to better integrate quality housing, transportation, education, workforce, and social service networks. Implementation began in 2015 under the administration of RTC. The plan identifies 300 specific strategies to make southern Nevada a more viable place to live, work, and play (http://sns.rtcsnv.com/implementation-matrix/). The following elements, highlighted in the plan's 2018 progress report, will help improve local air quality (http://sns.rtcsnv.com/2019/03/28/sns-highlights-regional-accomplishments-made-in-2018-in-new-report):

- Mixed use developments, e.g., Fremont9, C3 Lofts, The Charleston, and the Symphony Park Garages;
- An incentive program for installing electric vehicle charging stations established by NV Energy;

- More than 1,000 miles of bike lanes, paved paths, and shared roadways to improve walkability and bikeability;
- More than 5% of commuters bicycling, walking, and using public transport;
- A partnership between RTC and Lyft to provide a "ride on demand" paratransit service for locations outside of RTC's fixed-route bus service.

M. Additional Efforts

DAQ is considering numerous additional ways to reduce ozone levels in southern Nevada, investigating other local programs and reviewing feedback from EPA on previous Clark County reports. While ideas are still at the conceptual phase, some of the efforts under discussion include ways to convert additional local agency fleets to electric; converting diesel and gasoline equipment to electric or replacing it with newer, more efficient models; and clean contracting.

6. Outreach

The goal of DAQ's public information and education program is to create citizen awareness and interest in air quality, transform behaviors and habits, and encourage voluntary actions to reduce air pollution. Every year, Clark County issues a season-long ozone advisory that tells the public about ozone's health effects and suggests ways to reduce ozone pollution. DAQ also provides daily air quality reports and forecasts on its website, along with real-time monitoring data, and engages with outside organizations that focus on public outreach and communication.

A. 2018 Outreach Activities

In recent years, DAQ has updated brochures with current information on specific air quality topics and issues, identified outreach opportunities, reviewed outreach materials from other agencies, and given away promotional items as reminders. DAQ participated in 25 events in 2018, which yielded 6,320 engagements. Each engagement represents one person DAQ outreach volunteers spoke to, answered questions from, and shared vital air quality information with. Event audiences included the general public, senior citizens, K-12 children, college students, and the business community.

In addition to traditional outreach events, DAQ added First Friday to the outreach program, a large monthly event promoting the arts and local artists in an outdoor festival/fair atmosphere. Its audience is large, diverse, and unique.

A new series of outreach events called Operation Ozone was launched in 2018. Over seven weeks in August and September, DAQ sent small teams to local gas stations from 6–8 p.m. to say "thanks" for filling their gas tanks after sunset and educate the public on how they can help reduce ground-level ozone. As a token of our appreciation, we gave patrons a vehicle sun visor. Unlike our typical outreach events, Operation Ozone reached smaller audiences, but the targeted messaging was effective and positively received.

In 2017, DAQ launched social media accounts on Twitter, Facebook, and Instagram. Below is a list of 2018 outreach activities.

- January 25, 2018: Preview Las Vegas, Thomas and Mack Center
- March 2 and April 6, 2018: First Friday, Downtown Las Vegas
- April 7, 2018: Spring Fling, Floyd Lamb Park
- April 21, 2018: GREENFEST, Downtown Summerlin
- May 4 and June 1, 2018: First Friday, Downtown Las Vegas
- May 5, 2018: Las Vegas Science & Technology Festival, World Market Center
- June 4, 2016: Father's Day Sports Expo, Downtown Summerlin
- July 21, 2018: Cox Media Back to School Fair, Downtown Summerlin
- July 26, 2018: Back to Basics Back to School, Juvenile Justice Gym
- July 28, 2018: Cox Media Back to School Fair, Boulevard Mall

- August 4, 2018: Cox Media Back to School Fair, Meadows Mall
- August 11, 2018: Cox Media Back to School Fair, Galleria Mall
- August 14, 22, and 30, 2018: Operation Ozone, S&S Fuels
- September 4, 12, 20, and 25, 2018: Operation Ozone, S&S Fuels
- September 26, 2018: Environmental Health Expo, Southern Nevada Health District
- October 5, 2018: Construction Career Day, UNLV
- October 10, 2018: Young at Heart Senior Expo, Suncoast Casino
- October 13, 2018: Fall Green-up, Clark County Wetlands Park
- October 17, 2018: Young at Heart Senior Expo, Sunset Station Casino

B. 2019 Outreach Activities

DAQ has participated in 24 events through July 31, which yielded 7,330 engagements. Several outreach events were scheduled during Air Quality Awareness Week, April 29–May 4. In partnership with the Clark County School District, DAQ volunteers gave presentations to K-12 students throughout the week. In an effort to reach the Henderson-specific audience, DAQ began participating in the family-centric Last Friday event on Henderson's Water Street. Below is a list of 2019 outreach activities.

- January 24, 2019: Preview Las Vegas, Thomas and Mack Center
- February 13, 2019: Young at Heart Senior Expo, Suncoast Casino
- February 20, 2019: Young at Heart Senior Expo, Santa Fe Station Casino
- February 27, 2019: Young at Heart Senior Expo, Sunset Station Casino
- March 1 and April 5, 2019: First Friday, Downtown Las Vegas
- April 20, 2019: GREENFEST, Downtown Summerlin
- April 27, 2019: Cystic Fibrosis Foundation Walk, Henderson
- April 30–May 3, 2019: Awareness Week classroom visits, CCSD Schools
- April 30 and May 2, 2019: Operation Ozone, 7-Eleven
- May 3 and June 7, 2019: First Friday, Downtown Las Vegas
- May 4, 2019: Las Vegas Science & Technology Festival, World Market Center
- June 28 and July 26, 2019: Last Friday, City of Henderson
- July 27, 2019: Back to School, Boulevard Mall

The goal of outreach is to communicate the department's purpose to the community through public, private, and business events in a professional, informative, and friendly manner. DAQ believes educating the public is essential to allowing people to make informed decisions about their health and welfare.

C. Future Outreach Effort

DAQ continues the Ozone Action Days program, a voluntary initiative that asks county residents to take additional preventive actions when high ozone levels are predicted. Clark County meteorologists can forecast when ground-level ozone may exceed health standards; on those days, Clark County faxes air quality messages to media outlets, government agencies, and other Ozone Action Day[1] participants. The department also makes Ozone Action Day messages and daily forecasts available to the public through its website and social media posts.

DAQ is projected to participate in more than 40 outreach events in 2019. Projections for 2020 outreach include renewing commitments with Last Friday and Springs Preserve, as well as developing a specific set of outreach opportunities for Air Quality Awareness Week. Additional outreach efforts will be made for community events around cultural and ethnic celebrations, which cater to specific audiences DAQ might not otherwise reach.

DAQ is considering ways to enhance local outreach efforts. While these efforts are still at the conceptual phase, ideas under consideration include enhancing the Ozone Action Day program, developing a webpage geared toward children, creating an anti-idling campaign, and resurrecting a program that recognizes local businesses that go above and beyond regulatory requirements (formerly known as the "Crystal Air Award").

Beyond the traditional "information booth" style of outreach, DAQ is planning to schedule speaking engagements with local groups to educate and inform the public how it continues to protect the air we share on a daily basis. And DAQ will continue to encourage people to follow its social media channels.

[1] *Clark County Nevada Ozone Redesignation Request and Maintenance Plan,* Section 4.4.2.5.

7. Emission Reductions

DAQ used EPA's **AV**oided **E**missions and gene**R**ation **T**ool (AVERT) to calculate emission reductions in 2018, which were significantly attributable to renewable energy programs. Table 7-1 lists projects completed in 2017 and 2018, along with their generating capacities. Figure 7-1 shows the corresponding input file for the AVERT model (v2.3_05-24-2019).

Table 7-1. Renewable Energy Projects

Type	Project	MW
Solar	Boulder Solar II	50
	Moapa Southern Paiute Solar Project	250
	Switch Solar 1	79
	Switch Solar 2	100
	Techren Solar I	100
	Total	**579**

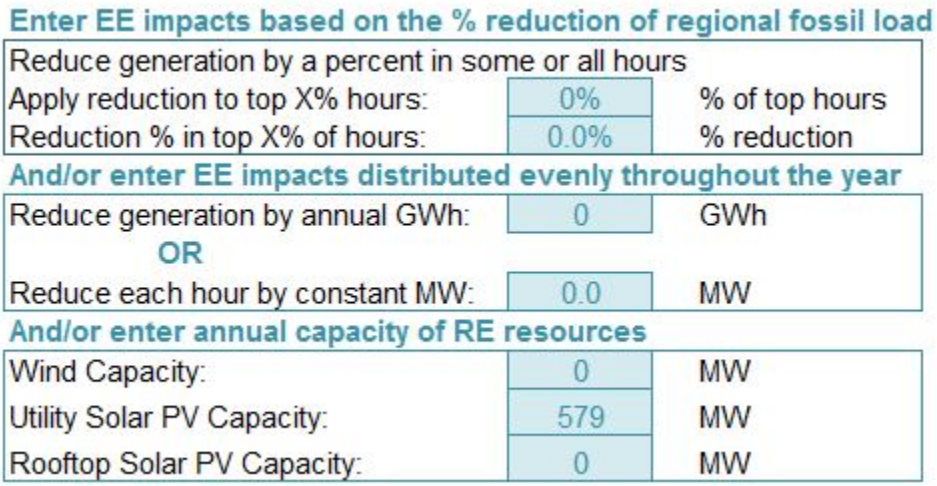
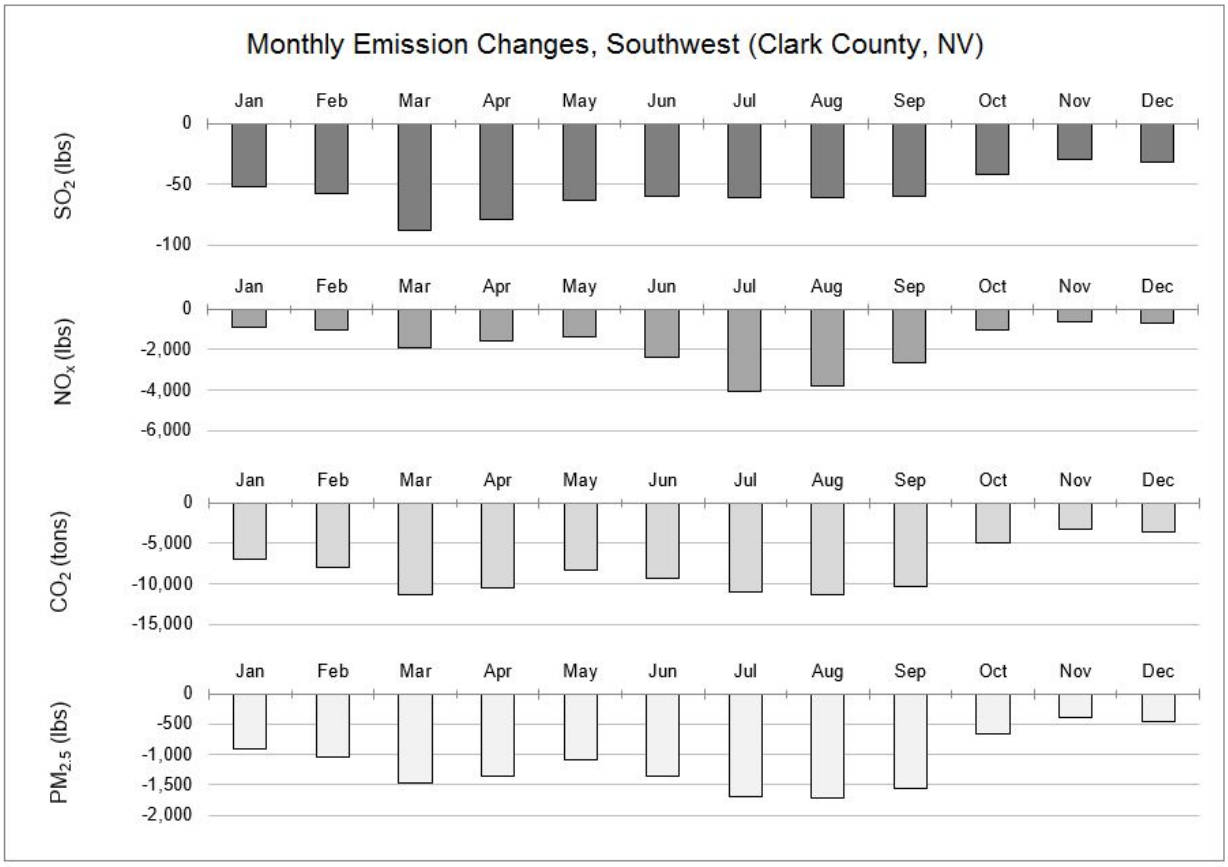


Figure 7-1. Inputs for AVERT Model.

According to the model, renewable energy generation annually displaced 217,930 MWh, which equals a reduction of 22,150 pounds of NO_x. During the ozone season, renewable energy displaced a total of 14,320 pounds of NO_x in Clark County (Table 7-2). Figure 7-2 shows the monthly emission reductions for specific criteria pollutants.

Table 7-2. Annual Displacement

Peak Gross Generation Post-EERE (MW)	Annual Gross Generation Post-EERE (MWh)	Annual Displaced Generation (MWh)	Annual Displaced NO_x (lb)	Annual Displaced CO_2 (tons)	Ozone Season Displaced NO_x (lb)	Ozone Season, 10 Peak Days Displaced NO_x (lb)
3,807	18,347,770	-217,930	-22,150	-99,180	-14,320	-80



Note: Negative numbers indicate displaced generation and emissions.

Figure 7-2. Monthly Displacements.

8. Conclusion

Clark County is continually striving to reduce VOC and NO_x through mandatory and voluntary control measures, including the installation and use of renewable energy and energy efficiency measures. Many organizations in Clark County are making great strides to reduce precursor emissions. Private companies and departments at all levels of government provide county residents with a variety of emission reduction programs. Future federal regulations for mobile sources, in conjunction with scheduled highway improvement projects, will further reduce NO_x emissions in the county.

DAQ will continue to research and evaluate other control measures, and will research and implement alternative ways of communicating ozone precursor reduction issues through public outreach. These concerted efforts on federal, state, and local levels should help Clark County meet and maintain the ozone NAAQS.